Monolithic Approach to Oxide Dispersion Strengthened Aluminum, Phase I

Completed Technology Project (2004 - 2004)

Project Introduction

Nassau Stern Company is investigating an approach for manufacturing oxide dispersion strengthened (ODS) aluminum in bulk rather than powder form. The approach combines novel ceramic injection molding technology to produce preforms for subsequent pressure infiltration casting with aluminum. The preforms contain between 30 and 40 volume percent sub-micron aluminum oxide and 60 to 70 volume percent nano-porosity. The resulting ODS aluminum could be near net-shape or as a billet ready for secondary processing. If successful, this approach will eliminate defects associated with consolidating powders into bulk form, such as contamination, adsorbed gas and non-uniform packing. Elimination of these defects will allow the ODS aluminum to perform closer to theoretical tensile strength, especially at elevated temperatures. ODS aluminum is also expected to possess exceptional elevated temperature fatigue behavior, vital for aerospace propulsion components and structures. The high level of aluminum oxide will also improve thermal expansion and stiffness behavior of the ODS aluminum. The envisioned elevated temperature performance of ODS aluminum will open up a wide range of space and aviation applications not feasible for conventional aluminum alloys.

Primary U.S. Work Locations and Key Partners

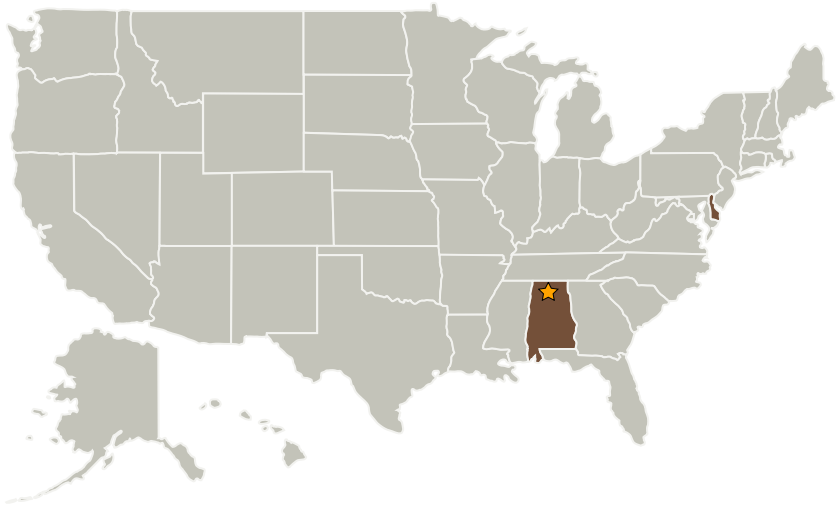

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Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
Nassau Stern Company	Supporting Organization	Industry	Newark, Delaware

Primary U.S. Work Locations	
Alabama	Delaware

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Alexander J Brown

Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.3 Aero Propulsion
    - TX01.3.1 Integrated Systems and Ancillary Technologies